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The Sustainable Classroom

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INTRODUCTION

Between 30 and 40 percent of the total energy consumption in Danish buildings is used for heating, ventilation and lighting. The majority (80-90%) of this consumption comes from buildings built before 1970. More than 50% of students in Danish schools are exposed to a bad indoor climate in the form of high concentrations of CO_2. Because of that, there is great potential in the energy renovation of existing buildings, including schools. Not only will it lead to major financial savings through the use of more climate-friendly building material, but by optimizing the indoor environment, student performance will also be improved.

PURPOSE

The purpose of the project is to choose the most ideal systems and controls within a classroom in order to make it as sustainable as possible. Furthermore it is the intention that the users are able to monitor and control both the indoor climate and the energy consumption, to provide an increased awareness and enthusiastic approach to energy.

The prime focus area is energy consumption and indoor climate, but life cycle analysis is also taken in consideration. The classroom is also intended as a test room where different solutions can be tested and analyzed in energy consumption, environmental impact, indoor environment and user satisfaction.

THE PROJECT

The project consists of an existing classroom that is being rebuilt with a new demand controlled hybrid ventilation systems, new lighting, CO2-, daylight- and PIR censor, energy meter and an operation panel to control and visualize the energy consumption. An intelligent control will ensure that the ventilation, lighting and heating are automatically regulated depending on the need. It will also be possible to control the indoor climate manually through the control panel or a smartphone, with some reservations. It will also be possible to follow the energy consumption by hour/day/month- or yearly basis. Data on energy consumption can be analyzed as the energy will be measured separately in heating, ventilation and electricity. An alarm will be triggered in the building management system if the energy consumption exceeds the maximum expected limit.

EXPECTATIONS

At present, the classroom lights are on almost constantly since most students do not turn them off when leaving the room and the heating is still on while the windows are open. Additionally, there is constant ventilation in all rooms even if there is no-one there. This is the reason why, we expect a large energy-saving from ventilation, light and heat.

By logging data and visualizing the room's energy consumption, it is expected that students become more aware of and interested in the use of energy in daily life.

It is also expected that the learning and activity level will increase hugely as a lower CO2 level helps learning.